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SERVICING REPORT
APARTMENT RENOVATION
87 MELROSE AVENUE
OTTAWA, ONTARIO

Prepared For:
Concorde Properties
408 Tweedsmuir Avenue
Ottawa, Ontario
K1Z 5N5

PROJECT #: 210157

DISTRIBUTION

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210157–SER – Site Servicing Plan



1 INTRODUCTION

This brief will address the serviceability of the site, specifically relating to the adequacy of the existing municipal sanitary sewer, and watermain to hydraulically convey the necessary sanitary sewage and water demands that will be placed on the existing system as a result of the proposed unit that is to be added to the existing 3 unit residential apartment.

The site is at 87 Melrose Avenue. The building is located along the east side of Melrose Avenue, 75 metres south of Gladstone Avenue.

It is understood that the owner of the existing building plans to renovate the basement to provide an additional apartment unit. There are to be no changes to the exterior of the building.

Kollaard Associates Inc has obtained the following information from drawing A2.0 – Basement Plan (Revision 07 Dated July 20th, 2016) and drawing set A2.1 – Ground Floor Plan, A2.2 – Second Floor Plan, A2.3 – Third Floor Plan (Revision 09 Dated July 21st, 2016); prepared by Robertson Martin Architects.

- The existing building consists of three (3) floors.
- The existing main floor consists of Unit 1 (Two bedrooms, 2 full bathrooms*)
- The existing second floor consists of Unit 2 (Three bedrooms, 2 full bathrooms*)
- The existing third floor consists of Unit 3 (Three bedrooms, 1 full bathroom, 1 powder room**)
- The basement is to be renovated to contain Unit 4 (One bedroom, 2 full bathrooms).

*full bathrooms refer to bathrooms containing a bathtub/shower, toilet and sink

** powder room refers to a toilet and sink

The existing water service is a copper pipe, 19mm in diameter. The water service is connected to the existing 203 mm PVC diameter watermain along Melrose Avenue.

The existing sanitary service is a PVC pipe, 135mm in diameter. The sanitary service is connected to the existing 250mm diameter sanitary sewer along Melrose Avenue.



2 WATERMAIN DESIGN

2.1 Water Demand

The water demand for the proposed development was calculated based on the City of Ottawa Water Distribution Design Guidelines (as amended) as follows:

The number of occupants is as follows:

One Bedroom units - (1) x 1.4 ppu:	1.4
Two Bedroom units - (1) x 2.1 ppu:	2.1
Three Bedroom units - (2) x 3.1 ppu:	<u>6.2</u>
Total:	9.7

Average daily water demand is $10 \times 350 \text{ l/person/day} \times (1/86,400 \text{ sec/day}) = 0.041 \text{ l/sec}$

Maximum daily demand is $2.5 \times 0.041 \text{ l/sec} = 0.101 \text{ l/sec}$.

Maximum Hourly demand is $= 2.2 \times 0.101 \text{ l/sec} = 0.223 \text{ l/sec}$.

Fire flow protection requirements were calculated as per the Fire Underwriter's Survey (FUS).

The building is of wood frame construction. The building does not contain sprinklers.

Calculations of the fire flow required for the building are provided in Appendix A.

From Appendix A, the maximum fire flow requirement is 8925 L/min or 148.8 L/sec.

2.2 Water Service Requirements

Kollaard Associates Inc. has obtained the number of fixtures from floor plan drawings provided by Robertson Martin Architects.

From the Ontario Building Code (O.B.C) table 7.6.3.2.A and based on the number and type of fixtures provided, the total number of fixture units for the building is 64.9 (refer to the Fixture Unit table in Appendix A). O.B.C table A7.6.3.1, shows the water service size for the number of fixture units in service. With a pressure range of 311 to 413 (46 to 60 psi), 64.9 fixture units and service length of less than 12 metres, the size of water service indicated is 1½" (38mm). As such the service is to be 38 mm in diameter.

2.3 Boundary Conditions

The following are the boundary conditions, HGL, for hydraulic analysis that were provided from the City of Ottawa.



- Minimum HGL = 107.9m
- Maximum HGL = 114.6m
- Maximum Day + Fire Flow = 99.7m

The City of Ottawa Design Guidelines – Water Distribution as amended by technical bulletin ISDTB-2014-02 indicates that if possible water distribution systems are to be designed to provide residual pressures of 345 to 552 kPa in all occupied areas outside of the public right-of-way.

In accordance with MOE Guidelines, the distribution system shall be sized so that under maximum hourly demand conditions the pressures are no less than 276 kPa (40 psi.)

With the existing 19 mm water service, and a minimum HGL of 107.9 m, under a maximum hourly demand of 0.223 l/sec the resulting minimum residual pressure on the third floor of the building would be 294 KPa. See the table below showing the water flow analysis.

Pipe Sections			Grade Elevation		Hydraulic Grade line							
Average Daily Demand			Start	End	Start	End	Ps	Pe	Q	V	D	A
Start	Along	End	m	m	m	m	kPa	kPa	m ³ /sec	m/sec	m	m ²
87 Melrose Avenue												
3rd floor min HGL	Service	3 storey residential	68.81	77.40	107.90	107.38	383	294	0.000223	0.7865	0.019	0.000284
2nd floor min HGL	Service	3 storey residential	68.81	74.40	107.90	107.38	383	323	0.000223	0.7865	0.019	0.000284
1st floor min HGL	Service	3 storey residential	68.81	71.45	107.90	107.38	383	352	0.000223	0.7865	0.019	0.000284
3rd floor max HGL	Service	3 storey residential	68.81	77.40	114.60	114.08	449	360	0.000223	0.7865	0.019	0.000284
2nd floor max HGL	Service	3 storey residential	68.81	74.40	114.60	114.08	449	389	0.000223	0.7865	0.019	0.000284
1st floor max HGL	Service	3 storey residential	68.81	71.45	114.60	114.08	449	418	0.000223	0.7865	0.019	0.000284

Assuming a 38 mm water service, a minimum HGL of 107.9 m, under a maximum hourly demand of 0.223 l/sec the resulting minimum residual pressure on the third floor of the building would be 299 KPa.

Pipe Sections			Grade Elevation		Hydraulic Grade line							
Average Daily Demand			Start	End	Start	End	Ps	Pe	Q	V	D	A
Start	Along	End	m	m	m	m	kPa	kPa	m ³ /sec	m/sec	m	m ²
87 Melrose Avenue												
3rd floor min HGL	Service	3 storey residential	68.81	77.40	107.90	107.88	383	299	0.000223	0.1966	0.038	0.00113
2nd floor min HGL	Service	3 storey residential	68.81	74.40	107.90	107.88	383	328	0.000223	0.1966	0.038	0.00113
1st floor min HGL	Service	3 storey residential	68.81	71.45	107.90	107.88	383	357	0.000223	0.1966	0.038	0.00113
3rd floor max HGL	Service	3 storey residential	68.81	77.40	114.60	114.58	449	364	0.000223	0.1966	0.038	0.00113
2nd floor max HGL	Service	3 storey residential	68.81	74.40	114.60	114.58	449	394	0.000223	0.1966	0.038	0.00113
1st floor max HGL	Service	3 storey residential	68.81	71.45	114.60	114.58	449	423	0.000223	0.1966	0.038	0.00113

Both of these minimum residual pressures are below the minimum recommended pressure by the City of Ottawa of 345 kPa and occur at the third floor fixture units. The loss of pressure due to the elevation difference is of much more significance than the friction and minor losses.



Both of the above calculated residual pressures exceed the minimum recommended residual pressure by the MOE of 276 kPa.

Calculations indicate that increasing the diameter of the existing 19 mm diameter water service to 38 mm will bring the minimum residual pressure on the third floor 5 kPa closer to the minimum residual pressure recommended by the City of Ottawa. Additional increases will have no appreciable effect. It is considered that the increase in residual pressure from 294 kPa with the existing 19 mm diameter service to 299 kPa using a 38 mm diameter service is not significant.

The use of either the existing 19 mm service or a replacement 38 mm service will result in a residual pressure less than 345kPa, and therefore a booster pump would be required. The booster pump size is to be specified by the mechanical engineer.

The existing service does not support the number of fixtures as per the Ontario Building Code. As such, the existing service is insufficient and must be replaced in the same location with a 38mm diameter lateral of Type “K” soft copper or PVC SDR 9 material complete with reinstatement of the existing road and sidewalk. All work is to be in accordance with City of Ottawa standards and practices.

2.4 Existing Fire Hydrants

Measured from the geoOttawa mapping, the two nearest fire hydrants are located as follows:

- Hydrant 1: (Between 91-93 Melrose Avenue) 12m south of the site on the east side of the road
- Hydrant 2 (62 Melrose) 113m north of the site (crossing Gladstone Avenue) on the west side of the road.

City of Ottawa Technical Bulletin ISTB-2018-02 Appendix I Table 1 provides guidance with respect to maximum flow to be considered from a given hydrant. From this table, a Class AA hydrant can contribute a maximum flow of 5,700 L/min when located less than 75 metres from the building. A class AA hydrant can contribute 3,800 L/min when located between 75 and 150 metres from the building.

Since hydrant 1 is located less than 75m from building and hydrant 2 is less than 150 metres from the building, these hydrants can be expected to provide a total combined contribution of 9500L/min. As previously indicated, the required fire flow is $148.8 \text{ L/sec} \times 60 \text{ sec/min} = 8928 \text{ L/min}$. The existing hydrants are considered to be sufficient to meet the required fire flow without needing an additional hydrant at the site.



Boundary conditions provided by the City of Ottawa indicate a minimum HGL of 99.7m for maximum daily flows plus fire flows. The hydrant elevation (hydrant 1) was considered to be 70.6m. Section 4.2.2 of the City of Ottawa water distribution guidelines states:

Where fire flow is provided; during periods of maximum day and fire flow demand the residual pressure at any point in the distribution system shall not be less than 140kPa.

Neglecting minor and frictional pipe losses in the lateral, the pressure required for fire flow and maximum daily demand is outlined below.

$$HGL = \frac{P}{\gamma} + Z$$

$$P = (HGL - Z) \times \gamma$$

P = Pressure (KPa)

- Minimum pressure 140 KPa
- Maximum pressure 552 KPa

Z = ground elevation + hydrant connection ~ 70.6m

$\gamma = 9.79 \text{ KN/m}^3$ (unit weight of water)

$$P = (99.70m - 70.6m) \times 9.79 \text{ KN/m}^3$$

$$P = 285 \text{ KPa}$$

This corresponds to a pressure of 285kPa. This pressure is above the minimum residual pressure of 140kPa during fire flow conditions, therefore the pressure is adequate for fire flow.

3 SANITARY SEWER DESIGN

3.1 Sanitary Demand

Prior to the additional unit (1 bedroom) being added to the basement, the number of occupants in the building was 9 persons.

One Bedroom units - (0) x 1.4 ppu:

Two Bedroom units - (1) x 2.1 ppu: 2.1

Three Bedroom units - (2) x 3.1 ppu: 6.2

Total: 8.3 (rounded to 9)

$$Q_{\text{Domestic}} = 9 \times 280 \text{ L/person/day} \times (1/86,400 \text{ sec/day}) = 0.029 \text{ L/sec}$$



$$\text{Peaking Factor} = 1 + \left(\frac{14}{4 + \left(\frac{P}{1000} \right)^{\frac{1}{2}}} \right) * 0.8 = 3.74 * \text{use 4 maximum}$$

$$Q_{\text{Peak Domestic}} = 0.032 \text{ L/sec} \times 3.73 = 0.109 \text{ L/sec}$$

Infiltration

$$Q_{\text{Infiltration}} = 0.33 \text{ L/ha/sec} \times 0.025 \text{ ha} = 0.008 \text{ L/sec}$$

$$\text{Total Peak Sanitary Flow (pre-renovation)} = 0.109 + 0.008 = 0.117 \text{ L/sec}$$

With the additional unit (1 bedroom) being added to the basement, the number of occupants in the building will be 10 persons. The new sanitary demands will be as follows:

$$Q_{\text{Domestic}} = 0.032 \text{ L/sec}$$

$$Q_{\text{Peak Domestic}} = 0.121 \text{ L/sec}$$

$$Q_{\text{Infiltration}} = 0.008 \text{ L/sec}$$

$$\text{Total Peak Sanitary Flow (post-renovation)} = 0.129 \text{ L/sec}$$

The Ontario Building Code specifies minimum pipe size and maximum hydraulic loading for sanitary sewer pipe. OBC 7.4.10.8 (2) states "Horizontal sanitary drainage pipe shall be designed to carry no more than 65% of its full capacity." A 135 mm diameter sanitary service with a minimum slope of 1.0% has a capacity of 11.5 L/s.

The maximum peak sanitary flows for the site is 0.129 L/s. Since 0.129 L/s is much less than $0.65 \times 11.50 = 7.47 \text{ L/s}$, the existing sanitary service would be properly sized if greater than or equal to 135 mm in diameter. The City of Ottawa sewer design guidelines (amended 2012) indicates that the minimum sanitary lateral diameter is 135mm to decrease the risk of plugging.

Since the existing sanitary service is 135mm in diameter, the sanitary service will have sufficient capacity.

3.2 Sanitary Service Lateral

O.B.C table 7.4.10.8, shows the allowable number of fixture units for a 135mm diameter sanitary service pipe at 1% slope is 390. Kollaard Associates Inc. has obtained the number of fixtures from floor plan drawings provided by Robertson Martin Architects.



From the Ontario Building Code (O.B.C) table 7.4.9.3, the total number of fixture units for the building is 63.4 (refer to the Fixture Unit table in Appendix A). As such the existing 135mm diameter sanitary service is adequate for the proposed sanitary flow.

3.3 Sanitary Sewer

The existing 250mm diameter sanitary sewer along Melrose Avenue has a capacity of about 45 Litres per second. The proposed sanitary demand from the development is 0.129 L/s. As such the proposed additional sanitary sewer capacity requirement is less than 0.57 percent of the capacity of the existing sanitary sewer. There will be sufficient capacity within the existing sanitary network for the proposed sanitary demand.

4 STORMWATER

Roof drainage on the building is conveyed through downspouts to the surface. Downspouts are directed to the front of the property, where surface runoff then flows to the street.

Water from the foundation drains go to a sump pump located in the basement. The sump pump is discharged to the existing 100mm storm lateral. The storm lateral is connected to a 300mm diameter storm main on Melrose Avenue. The storm is not connected to the sanitary. There are no proposed changes to the storm service.

5 CONCLUSIONS

This report addresses the adequacy of the existing sanitary sewer system and watermain to service the building on 87 Melrose Avenue. Based on the analysis provided in this report, the conclusions are as follows:

The peak sewage flow rate from the proposed development will be 0.129 L/sec. The existing municipal sanitary service and sewer should have adequate capacity to accommodate the increase in peak flow. The City has not identified any capacity issues in the existing sanitary sewer system.

The existing water service is not of adequate size for the proposed number of fixture units. The water service is to be replaced with a 38mm diameter water lateral. The minimum residual pressure on the 3rd floor is below the minimum recommended pressure by the City of Ottawa of 345 kPa. The minimum pressure on the third floor exceeds the minimum MOE pressure requirement of 276 Kpa for a residential system. As such, the low pressure concern is a



functional rather than a health concern. A booster pump may be required to provide a pressure of at least 345KPa on the third floor.

With the two hydrants in proximity to the site, it is our understanding that there is sufficient water and pressure available for a fire flow of 148.8L/sec at 140KPa.

We trust that this report provides sufficient information for your present purposes. If you have any questions concerning this report or if we can be of any further assistance to you on this project, please do not hesitate to contact our office.

Sincerely,
Kollaard Associates, Inc.



Steven deWit, P.Eng.



Appendix A: Servicing Calculations

- Fire Flow Calculations
- Hydrant Locations
- Boundary Conditions
- Sanitary Fixture Count
- Water Fixture Count



APPENDIX C: CALCULATION OF FIRE FLOW REQUIREMENTS -87 Melrose Avenue
Calculation Based on Fire Underwriters Survey, 1999

1) An estimate of the Fire Flow required for a given fire area may be estimated by:

$$F = 220 \times C \times \sqrt{A}$$

where F = required fire flow in litres per minute
A = For combustible construction total flow area includes all storeys, but excluding basements at least 50% below grade

C = coefficient related to the type of construction:
1.5 for wood construction (structure essentially combustible)
1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
0.8 for noncombustible construction (unprotected metal structural components, masonry or metal walls)
0.6 for fire-resistive construction (fully protected frame, floors, roof)

Area of floors 1-3 = 331.9 m² Number of storeys above grade 3

A = 331.9 m² (Wood Construction)
C = 1.5
F = 6,012 L/min -----> Rounded to nearest 1000 = **6,000**

2) The value obtained in 1. may be reduced by as much as 25% for occupancies having a low

Non-combustible =	-25%	
Limited Combustible =	-15%	
Combustible =	0%	L/min
Free Burning =	15%	
Rapid Burning =	25%	

Reduction due to low occupancy hazard = -15% x 6,000 = **5,100** L/min

3) The value above may be reduced by up to 50% for automatic sprinkler system

Reduction due to automatic sprinkler system = 0% x 5,100 = **5,100**

4) The value obtained in 2. may be increased for structures exposed within 45 metres by the fire

<u>Separation (metres)</u>	<u>Condition</u>	<u>Charge</u>
0m to 3.0m	1	25%
3.1m to 10.0m	2	20%
10.1m to 20.0m	3	15%
20.1m to 30.0m	4	10%
30.1m to 45.0m	5	5%
45.1m to	6	0%

<u>Exposures</u>	<u>Distance(m)</u>	<u>Condition</u>	<u>Charge</u>
Side 1	<u>3.0</u>	1	-----> 25%
Side 2	<u>4.0</u>	2	-----> 20%
Front	<u>17.0</u>	3	-----> 15%
Back	<u>5.5</u>	2	-----> 20%
			<u>75%</u>

Increase due to separation = 75% x 5,100 = **3,825** L/min

The fire flow requirement is = **5,100**

Increase due to Separation = 3,825

The Total fire flow requirement is = 8,925
or **148.8** L/sec



GEO OTTAWA –screenshot

<https://maps.ottawa.ca/geoottawa/>
Hydrant locations added and dimensioned



***To be noted that the geo-ottawa water infrastructure layer shows a hydrant at 99 Melrose Avenue. Location is at 91-93 Melrose Avenue.

Subject: Boundary condition request on 87 Melrose Avenue

From: "Wu, John" <John.Wu@ottawa.ca>

Date: 2021-03-04, 3:30 p.m.

To: "amanda@kollaard.ca" <amanda@kollaard.ca>

Hi, this is the boundary condition you request through Richard,

Here is the result:

The following are boundary conditions, HGL, for hydraulic analysis at 87 Melrose (zone 1W) assumed to be connected to the 203 mm on Melrose Ave (see attached PDF for location).

Minimum HGL = 107.9 m

Maximum HGL = 114.6 m

Max Day + Fire Flow (148.8 L/s) = 99.7 m

These are for current conditions and are based on computer model simulation.

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

Thanks.

John Wu, P.Eng.

Project Manager, Infrastructure Approval

Development Review (Urban Services)

Gestionnaire de projet, Approbation de L'infrastructure

Examen des projets d'aménagement (Services urbains)

Planning, Infrastructure and Economic Development Department

Services de planification, d'infrastructure et de développement économique

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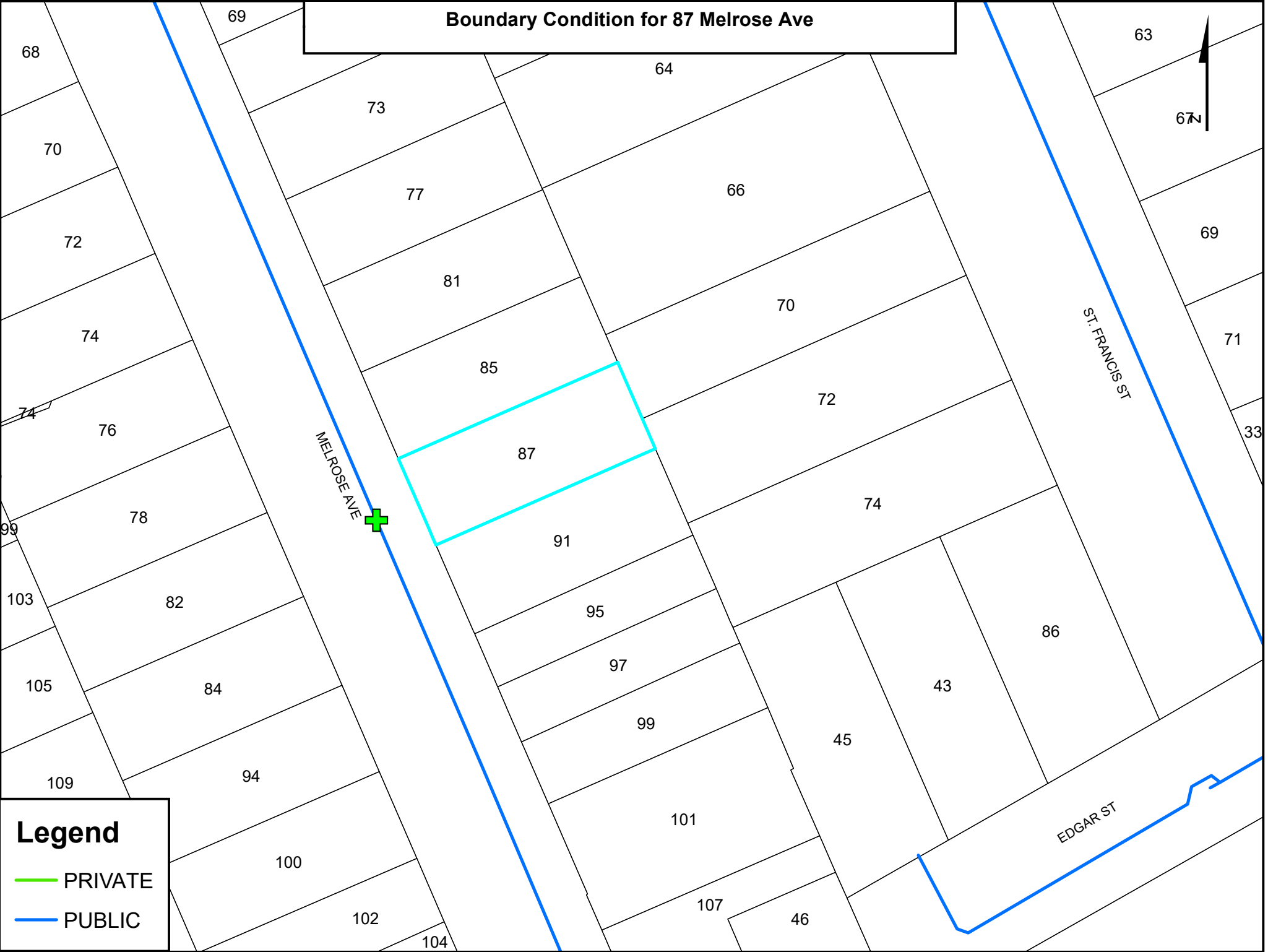
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— Attachments: —

87 Melrose March 2021.pdf

76.9 KB

Boundary Condition for 87 Melrose Ave



Legend

- PRIVATE
- PUBLIC

Sanitary Fixture Units 87 Melrose

From O.B.C table 7.4.9.3

Floor	Unit	1.4	2.1	3.1	Total # persons	Bathroom Group 6		Toilet 4		Bathroom sink 1.5		Kitchen Sink 1.5		Dishwasher 1		Washing Machine 1.5		Total Hydraulic Load fixture units
		persons/unit	persons/unit	persons/unit		# bathrooms	Hydraulic load	# sinks	Hydraulic load	# sinks	Hydraulic load	Hydraulic load	# washers	Hydraulic load				
Basement	1	1			1.4	2	12	0	0	0	0	1	1.5	1	1	1	1.5	16
1st floor	2		1		2.1	2	12	0	0	0	0	1	1.4	1	1	1	1.5	15.9
2nd floor	3			1	3.1	2	12	0	0	0	0	1	1.5	1	1	1	1.5	16
3rd floor	4			1	3.1	1	6	1	4	1	1.5	1	1.5	1	1	1	1.5	15.5
Total					9.7	7						4		4				63.4

Water Fixture Units 87 Melrose

From O.B.C table 7.6.3.2A

Floor	Unit	1.4	2.1	3.1	Total # persons	Bathroom Group	6	Toilet	2.2	Bathroom sink	1.5	Kitchen Sink	1.4	Dishwasher	1.4	Washing Mach	2	Total Hydraulic Load
		persons/unit	persons/unit	persons/unit		# bathrooms		Hydraulic load	Hydraulic load	# sinks	Hydraulic load	# sinks	Hydraulic load	# dishwashers	Hydraulic load	# washers	Hydraulic load	
Basement	1	1			1.4	2	12	0	0	0	0	1	1.4	1	1.4	1	2	16.8
1st floor	2		1		2.1	2	12	0	0	0	0	1	1.4	1	1.4	1	2	16.8
2nd floor	3			1	3.1	2	12	0	0	0	0	1	1.4	1	1.4	1	2	16.8
3rd floor	4			1	3.1	1	6	1	2.2	1	1.5	1	1.4	1	1.4	1	2	14.5
Total					9.7		7					4		4				64.9



Appendix B: Drawings

- 210157 – SER – Site Servicing Plan

MELROSE AVENUE

DRAWING NUMBER: 210157-SER

- CONSTRUCTION NOTES:**
- All dimensions and elevations are in metres. Do not scale drawing.
 - This drawing is not a legal survey, a utility plan or a site plan and is for water servicing only.
 - TBM = Tip of arrowhead on existing fire hydrant, elevation = 70.12 metres.
 - This drawing cannot be accepted as acknowledging all of the utilities, and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
 - This drawing is not for construction until approved by the relevant authorities.
 - Top of Foundation (TOF) elevations and assumed Underside of Footing (USF) elevations are assumed.
 - Existing location of watermain, sanitary sewer and storm sewer as shown on this plan are approximate. Contractor to verify in the field to confirm exact location prior to construction.
 - If water service is less than 1.0 metres from sewer, manhole or catchbasin, contractor shall insulate between them with s/m rigid insulation.
 - Bedding for sewers and watermain installation shall be granular type 'B' compacted to 95% dry proctor density.
 - All dimensions to be verified on site by contractor prior to construction.
 - Client is responsible for acquiring all necessary permits.
 - Elevations of existing storm and sanitary services were provided by the Information Centre at the City of Ottawa.
 - Any changes made to this plan must be verified and approved by Kollaard Associates Inc.

LEGEND

- EXISTING CATCHBASIN
- EXISTING MANHOLE
- STORM CONNECTION
- SANITARY CONNECTION
- WATER CONNECTION
- STM — STORM SEWER
- SAN — SANITARY SEWER
- W — WATERMAIN
- HP HYDRO POLE
- FH FIRE HYDRANT
- TEMPORARY BENCHMARK
- PROPOSED WATER VALVE

REV.	NAME	DATE	DESCRIPTION
0	AVB	25/03/2021	FOR CITY OF OTTAWA REVIEW

Kollaard Associates
Engineers

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KOG 1J0 FAX (613) 258-0475
http://www.kollaard.ca

CLIENT:
CONCORDE PROPERTIES

PROJECT:
PROPOSED SITE SERVICING PLAN

LOCATION:
87 MELROSE AVENUE
CITY OF OTTAWA, ONTARIO

DESIGNED BY:
AVB

DATE:
MAR 25, 2021

DRAWN BY:
AVB

SCALE:
1:150

KOLLAARD FILE NUMBER:
210157



TBM = TIP OF ARROWHEAD ON EXISTING FIRE HYDRANT, ELEVATION = 70.12 METRES

THIS DRAWING IS NOT FOR CONSTRUCTION UNTIL APPROVED BY THE RELEVANT AUTHORITIES

